metaphase, and is rapidly re-accumulated in peripheral chromosomal region in early anaphase. We also found a novel and plant-specific sub nucleolar structure named 'nog1 body' which appears in nucleus region during late anaphase and early telophase.

P0686 – ePoster

Isolation of salt glands from *Avicennia officinalis* for microscopic studies

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Salt glands are unique specialized epidermal structures found on the aerial surfaces of some halophytic species. Plants with salt glands regulate internal salt levels by secreting the excess salts via these glands. We focus on the study of the salt glands of *Avicennia officinalis*, a salt-secreting mangrove tree species surviving well in intertidal zones of the tropical and subtropical areas. In our attempts to study the salt glands at the glandular level in greater detail, we developed a method to isolate large numbers of salt glands from the leaves of *A. officinalis*. By removing the abaxial epidermal cell layers from the leaves and incubating the resulting leaf tissues in an enzyme solution, salt gland-enriched adaxial epidermal peels can be detached from the mesophyll-palisade tissues after an hour of enzymatic digestion. The salt glands can then be released through the grinding of these epidermal peels. Using this method, approximately 2 × 104 – 3.5 × 104 salt glands could be obtained from about 5 g of fresh leaf tissues. This approach freed the salt glands from the interference of neighbouring leaf cells for easy manipulations. Successful isolation of salt glands achieved within 4 hours enabled observations of salt glands to be performed within the same day. The potential of applying such a system for subsequent imaging and cytological studies will be discussed.

P0687 – ePoster

Morphogenetic gradients in silver firs (*Abies alba* Mill.) and their plasticity

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Silver fir presents a great hierarchised architecture with a strict monopodial development (Massart's architectural model). Moreover silver fir presents neither polycyclism nor immediate branching (often involved in the plastic response of primary growth). Despite these limitations, silver firs present a large range of distribution: from Central Europe to Mediterranean mountains. The aim of this poster is to test the hypothesis that silver firs offset this limitation with a strong plasticity at the annual shoot scale and on needle morphology. The study was done in Mont Ventoux, a French Mediterranean mountain which provides contrasted forest environments in terms of elevation and with a marked summer drought.

Quantitative traits of annual shoots of 2 years old branches (length, diameter and number of needles, dry mass) and needles (surface and dry mass) where recorded on 80 saplings growing in different light environments. Effects of tree size and architectural position of annual shoot within tree crown on measured traits were higher than any environmental fluctuation. These morphogenetic gradients are consistent with the concept of physiological age of meristems (Barthélémy & Caraglio 2007): huge effect of tree development, branching order and position. All studied traits present a significant plasticity which may be implies in the success of silver firs in the studied site. No clear hierarchy was found between the phenotypic plasticity of annual shoot plasticity and the one of needles. We can suggest that all measured traits act simultaneously during tree development and in response to environmental fluctuations ('a variational module' sensu Wagner et al 2007).

P0688 – ePoster

Plant architecture: from concepts to applications

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Since Hallé & Oldeman (1970), plant architecture concepts are used when studying plant form and ontogeny. Using the identification of several morphological criteria and considering the plant as a whole, from germination to death, architectural analysis is essentially a detailed, multilevel, comprehensive and dynamic approach to plant development. After twenty years, this approach was completed by appropriate quantitative methods of mathematical analyses and modeling approaches (de Reffye et al. 1991). Recent researches in this field have greatly increased our understanding of plant structure and development and have led to the establishment of a real conceptual and methodological framework for plant form and structure analysis and representation (Godin & Caraglio 1998; Guédon et al. 2001; Barczi et al. 2008; Mathieu et al. 2009). In 2007, Barthélémy & Caraglio published a large review on plant architecture which provides generic terminology and the concepts for plant architecture interpretation. The current poster aims to briefly illustrate some applications of the main concepts like architectural unit, reiteration process, morphogenetical gradients and physiological age of meristems. Specific data and results are given to provide reproducible examples on other species. Theses concepts are also useful tools for sampling plant structure in regards to ecophysiological questions on leaf physiology (Roggy et al. 2005; Coste et al. 2009; Leroy et al. 2009) and wood anatomy and hydraulic (Cochard et al. 2005). Finally, we address some present questions on phenotypic plasticity (Stecconi et al. 2010; Charles-dominique 2010; Taugourdeau et al, 2011), forestry (Rutishauser et al, 2010), agronomy (Rey et al. 2008) and paleobotany (Meyer-Berthaud et al. 2010) and particularly how

architectural features can become relevant original traits for ecological and evolutionary studies.

P0689 – ePoster

Anatomical studies of the gynoecium of *Anthurium* Schott (Araceae)

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Anthurium is the largest genus of Araceae with approximately 1000 species, distributed from Mexico to Argentina, and especially in Brazil with about 120 species. The objective of this work was to study the anatomy of the gynoecium of 11 species of *Anthurium*, aiming to contribute distinguishing characteristics of the family. All of the species studied have: bicarpellate and bilocular gynoecium, locules filled with mucilage; cleft-shaped stigma, formed by unicellular trichomes, a stylar canal lined with transmitting tissue formed of short unicellular trichomes; and a proximal stylar region and placenta formed by long secretory trichomes. The epidermis in the region adjacent to the stigma, the length of the stylar region, the width of the ovarian septum, and placentation vary in the species studied here. What is noteworthy in this study is the confirmation of the occurrence of secretory trichomes in the stylar canal and in the placenta of all the species of *Anthurium* studied, confirming the trait for the genus in Araceae.

P0690 – ePoster

Endopolyploidy in *Dendrobium* Chao Praya Smile (Orchidaceae)

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Dendrobium is one of the largest genera in the family Orchidaceae. The hybrids are commercially important in the orchid industry. Different parts of *Dendrobium* plants have been used as explants for micropropagation. Unfortunately, not all the plants produced through micropropagation were found to be true-to-type. Variations have been reported among plants regenerated from explants of in vitro cultures. A possible cause of the observed somaclonal variants could be the pre-existing ploidy differences in somatic cells of the initial explants. In this paper, the occurrence of endopolyploidy in greenhouse-grown *Dendrobium* Chao Praya Smile, a commercial hybrid, was analysed using flow cytometry. Different tissue types harvested from different developmental stages of the plants were compared. Nuclei of up to 8C DNA content were present in the first leaves of greenhouse-grown plants that were in their vegetative phase. On the contrary, analyses of leaves from plants that had bolted, nuclei of up to 32C DNA content were detected in the first leaves. Shoot tips and axillary buds from plants in the vegetative stage were found to contain a mean frequency of 4.6 and 8.9% 8C nuclei respectively. Tissues near the base of 6-cm root contained a mean frequency of 18.7% nuclei with 8C DNA content, whereas 8C nuclei accounted for 9.3% of the total nuclei population in the tip analysed. Since the ploidy variations of the floral parts harvested at different days after anthesis were similar, endopolyploidy in the floral tissues was not developmentally regulated. The maximum C-value detected in the floral tissues is 16C.

P0691 – ePoster

Foliar anatomical studies in some family euphorbiaceae

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This paper deals with foliar anatomical study of 17 genera and 17 species from family Euphorbiaceae. The leaves are dorsiventral and their leaves have mesophyll differentiated distinctly into pallisade and spongy. They are usually hypostomatic except Chrozophora rottleri, Dimorphocalyx lawianus, Manihot esculenta and Simmondsia chinensis. The epidermal has thick cuticle is followed by chlorenchymatous hypodermis. The vasculature received in the midrib region is respond in various forms of vascular bundles. The anatomical features are taxonomically significant at specific level.
Key words - Foliar anatomy, Taxonomy, Euphorbiaceae.

P0692 – ePoster

Biochemical responses of Iranian alfalfa ecotypes to salt stress

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An experiment was conducted to characterize biochemical responses to salt stress of five Iranian alfalfa ecotypes. A hydroponics system was used at University Putra Malaysia from December 2008 until April 2009. The seeds were planted in plastic pots filled with sand and immersed in nutrient solution. After 2 months when the plants became mature and stable the EC of nutrient solution was increased by adding sodium chloride gradually. At every 15 days the NaCl was increased by 3 dS/m, and the final EC was 18 dS/m. Samples were taken at each time when plants were exposed to three levels of salinity: 6, 12, and 18 dS/m. The biochemical components measured were: root soluble sugars (fructose, glucose, and sucrose), free proline, and total amino acids. Three soluble sugars in root including fructose, glucose, and sucrose were measured using HPLC. The results indicated that when alfalfa is exposed to salt stress the monosaccharides were more affected than the disaccharides. There was significant linear increase of fructose in roots under salt stress for all ecotypes. The concentration of glucose in root increased under salt stress. There was significant difference between ecotypes in terms of concentration of glucose under salt stress. Influence of salt stress on concentration of sucrose was same with reducing sugars where there was significant difference between levels of salt stress in